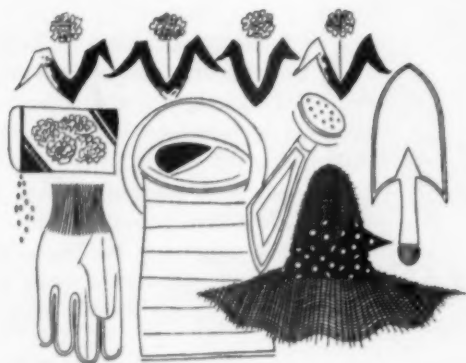


Growing Garden Flowers

from
SEED



R. C. Allen

Growing Garden Flowers from Seed

BY R. C. ALLEN

AN INTERESTING experience in gardening is to start plants from seed and to watch their development through various stages of growth to maturity. All annuals, and the majority of the more common herbaceous perennials, can be grown easily from seed with no equipment except that available in the home.

This bulletin is planned to serve as a guide for home gardeners who wish to grow their own annual and perennial plants from seed for the first time and to offer suggestions for improving the techniques of those who have had some experience. Obviously, many deviations from the recommendations may be practiced where conditions or equipment warrant.

SOWING SEEDS IN THE GARDEN

Preparation of the soil

BEFORE any seed is sown, the soil should be thoroughly spaded and the top layer finely pulverized. If the soil is not naturally loose and friable, some form of organic matter should be incorporated. Well-rotted manure, peat moss, leaf mold, or compost may be used at the rate of from $\frac{1}{2}$ to 1 bushel a square yard of soil area. Such organic material should be thoroughly mixed with the soil to a depth of from 4 to 6 inches and the surface raked smooth. If the soil appears uneven or lumpy, the top layer should be put through a $\frac{1}{4}$ -inch mesh screen.

Sowing seed where plants are to bloom

Some annuals such as poppies, salpiglossis, and lupines, which do not transplant easily, should be sown where they are to bloom. Many other kinds of quick-growing annuals also may be planted in this way.

It is best to make small indentations from 4 to 6 inches apart and about $\frac{1}{4}$ to $\frac{1}{2}$ inch deep, according to the size of the seed to be sown, in the surface of the prepared soil. Two or three seeds are then placed in each hole and covered with soil. If more than one seed germinates, all but the strongest seedlings should be removed. When the seedlings begin to show their second set of true leaves, many of them should be pulled out so the remaining plants are spaced from 12 to 24 inches apart, depending upon the ultimate size of the plants.

Sowing seed in prepared beds for transplanting

Starting seedlings in special beds has the advantage of enabling one to watch germination closely and to provide good cultural conditions. The soil should be carefully prepared as recommended and marked in shallow furrows from 6 to 8 inches apart. The furrows should vary in depth from $\frac{1}{2}$ inch to approximately 2 inches, depending upon the size of the seed to be sown. Small seeds are sown in shallow furrows, while larger ones require deeper planting.

After the furrow is prepared, the seeds should be distributed in the trench so that they are spaced at least $\frac{1}{4}$ inch apart. Before the seed is covered, a marker should be placed at the beginning and end of the row to show the kind of plant and the variety and to mark the row occupied.

Covering the seed

If the ground has been finely pulverized, soil from the sides of the furrow is pulled over the seed. If the soil is not fine and uniform, the seed should be covered with soil that has been screened.

Loose soil that does not naturally tend to crust over may be firmed lightly with a piece of board to bring it in closer contact with the seed. A piece of burlap, or even newspaper, over the rows helps to keep the surface from drying and packing. It may be held in place by covering the edges with soil or small stones. Just as soon as the seeds start to germinate, this artificial covering should be removed. The seedbed must be watched closely from day to day to see that the soil is kept uniformly and constantly moist.

SOWING THE SEEDS IN HOTBEDS AND COLD FRAMES

THE METHOD of starting seeds in hotbeds or cold frames is essentially the same as sowing seeds in the open ground. The construction of hotbeds and cold frames is discussed in Cornell Extension Bulletin 468, *Structures for Starting and Growing Ornamental Plants*. If one wishes to start the plants before April 15, a hotbed is needed. After April 15 the seed may be sown in a cold frame. Usually it is not safe to sow seed in a hotbed before March 15.

In either a hotbed or cold frame the surface of the soil should be thoroughly loosened, pulverized, and leveled. The soil mixture suggested for starting seedlings indoors (page 6) may be used if the soil in the frame is unsatisfactory.

Rows for the seed are marked from 2 to 4 inches apart. The seed is distributed in the rows and covered as recommended for outdoor seedbeds. Burlap may be spread over the bed until germination takes place, then it should be immediately removed. The surface of the soil must not become dry. The frame should be ventilated on warm sunny days to prevent too high temperatures.

As soon as the seedlings appear, the temperature in the frame is kept close to 55° F. On warm, sunny days the sash may be entirely removed.

Seedlings large enough to handle should be transplanted. If danger of frost is past, they may be set in the place where they are to bloom, but ordinarily it is best to transplant them to another section of the frame. The seedlings are spaced from 3 to 4 inches apart.

As the weather warms the frames should be left open during most of the day. The plants are set in the garden when they are from 4 to 8 inches tall.

SOWING SEEDS INDOORS

ANNUALS

Time to sow seed

THE approximate date to sow annual seeds indoors is important because the different kinds vary in their rate of germination and development. In general, the goal is to have vigorous, well-grown plants ready to put into the garden by the last week of May. At this time there is little danger of killing frosts throughout most of New York State during a normal year.

The approximate time to start seed for planting in the garden is shown in table 1. If plants are set earlier, the starting time may be moved ahead a corresponding number of weeks. For example, normally calendulas are started the third week in April to be ready for planting in the garden the last week of May. If they are to be planted the second week in May, they should be started the first week in April.

Cultural requirements

Sowing seed indoors in early spring is perhaps the best way to obtain plants for the garden if reasonably good cultural conditions can be supplied. These conditions are:

A light sunny window, preferably facing south where the light can reach the seedlings unobstructed by shades, curtains, or drapes. A sun room on the south side of the house is excellent. Sometimes attic windows can be utilized if the temperature does not fall too low at night.

A temperature of approximately 68° F. during the germination period and a temperature of from 55° to 60° F. after the seedlings appear. A temperature of 68° F. is optimum for germination of most kinds of garden flowers. After germination, the cooler temperature insures more sturdy growth and the seedlings are less likely to become tall and spindly than when the temperature is higher.

Good ventilation on warm days.

Provision for watering the seedlings thoroughly from day to day without injury to furniture or floors. The automatic method described on pages 6 to 8 is excellent.

TABLE 1. TIME TO SOW SEEDS AND TO TRANSPLANT ANNUALS TO HAVE PLANTS READY TO SET IN THE GARDEN THE LAST WEEK IN MAY

Plant	Sow seed in	Transplant seedlings in:
Ageratum	March, third week	April, third week
Amaranthus	April, third week	May, first week
Anagallis	April, first week	April, fourth week
Babysbreath	April, third week	May, first week
Balsam	April, second week	May, first week
Batchelor's button	April, third week	May, first week
Calendula	April, third week	May, first week
California poppy	April, third week	May, first week
Calliopsis	April, first week	April, third week
Candytuft	April, third week	May, first week
China aster	April, second week	April, fourth week
Chrysanthemum	April, third week	May, first week
Clarkia	April, fourth week	May, second week
Cleome	April, third week	May, second week
Cockscomb	April, second week	April, fourth week
Cosmos	April, fourth week	May, second week
Cynoglossum	April, first week	April, fourth week
Dahlia	March, first week	March, fourth week
Dianthus	April, first week	April, fourth week
Dimorphotheca	April, first week	April, fourth week
Gaillardia	April, third week	May, first week
Godetia	April, second week	April, fourth week
Gomphrena	April, third week	May, second week
Hunnemannia	April, first week	April, fourth week
Kochia	April, second week	May, first week
Larkspur	April, first week	April, fourth week
Lavatera	April, second week	May, first week
Lobelia	March, third week	April, third week
Marigold	April, second week	April, fourth week
Mignonette	April, third week	May, first week
Mimulus	April, third week	May, first week
Morning glory	April, third week	May, first week
Nasturtium	April, third week	May, first week
Nicotiana	April, second week	May, first week
Nierembergia	March, third week	April, first week
Nigella	April, first week	April, third week
Petunia	March, third week	April, first week
Phlox	April, second week	April, fourth week
Poppy	April, fourth week	May, second week
Salpiglossis	April, first week	April, third week
Salvia	April, first week	May, first week
Scabiosa	April, third week	May, second week
Schizanthus	April, third week	May, first week
Snapdragon	March, second week	April, first week
Statice	April, first week	April, third week
Straw flower	April, first week	April, third week
Sunflower	May, first week	May, second week
Sweet alyssum	April, second week	April, third week
Verbena	March, second week	April, second week
Vinca	April, first week	April, third week
Zinnia	April, fourth week	May, second week

Equipment and supplies

The equipment need not be elaborate (figure 1). The following items are essential:

1. Shallow boxes, known as *flats* (12 by 18 by 3 inches is a convenient size) or *flower pots*
2. Good garden loam, preferably sterilized
3. Peat moss or leaf mold
4. $\frac{1}{4}$ -inch-mesh screen, or about the same size as window screening
5. A small piece of board to level the soil
6. Pieces of burlap to cover the seed flat until germination
7. Wooden plant labels
8. Wick



FIGURE 1. EQUIPMENT

Soil mixture

Seeds do not require rich soil for germination. The soil, however, should be loose in texture and should drain readily and yet hold moisture. A good formula for mixing the soil follows:

- 2 parts by volume of good garden loam, sterilized if possible
- 1 part by volume of peat moss or leaf mold
- 1 part by volume of coarse sand

These materials should be thoroughly worked together and, unless the mixture is fine and uniform, put through a coarse screen, about $\frac{1}{4}$ -inch mesh.

Preparing seed flats and flower pots for automatic watering

Installing the wick

Recently, a new way to supply water to seed flats was developed by Professor Kenneth Post at Cornell University. It has the advantage of

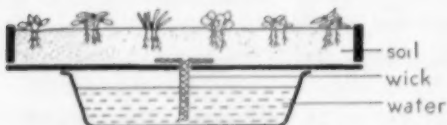


FIGURE 2. THE WICK AND FLAT IN PLACE

supplying a uniform and optimum quantity of water with a minimum of attention. A glass wick (figure 2) extends from the bottom of the flat or flower pot to a pan of water. The

water is carried up the wick by capillarity to the soil. This system may be used in either flats or pots. Pots, if used, should be at least 5 inches in diameter at the top. The flat is prepared by boring a hole $\frac{1}{2}$ or $\frac{3}{8}$ inch in diameter in the bottom through which the wick is inserted (figure 3). One wick is enough for a flat 20 inches square or less. More than one wick is needed for a large flat. Each wick should be approximately 5 inches long. The wick is loosened at one end a distance of $1\frac{1}{2}$ inches before it is placed through the hole in the

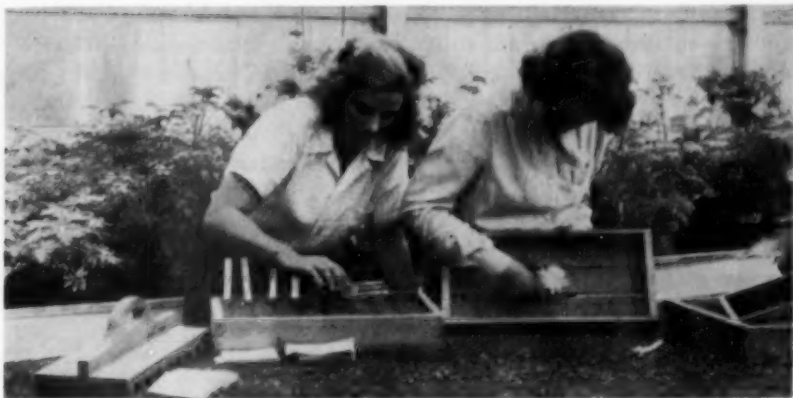


FIGURE 3. INSERTING THE WICK IN THE FLAT AND PLANTING SEED

flat or flower pot. Then it is put in the flat or flower pot and the frayed end flattened so that it forms a circle of fibers 3 inches in diameter at the bottom. Glass wicks may be obtained from many florists and horticultural supply houses.

Glass wicks can be used for many years. A cloth wick may be substituted



FIGURE 4. METHOD OF PREPARING BURLAP AND GLASS-WOOL WICK

but it can be used for one season only. Cloth wicks made from burlap, cheesecloth, or similar materials are satisfactory. A piece of clean burlap 5 inches long and 3 inches wide is carefully made into a roll 5 inches long, by wrapping the burlap at the bottom with cotton twine to within $1\frac{1}{2}$ inches from the top, where the twine is tied firmly (figure 4). At the untied top the burlap is slit in several places so that the ends can be laid back at right angles to the body of the wick, and then placed in the flat so that the frayed end forms a circle approximately 3 inches in diameter in the bottom of the flat (figure 3).

If cheesecloth is used, a piece 5 by 15 inches is needed to give a wick of the desired diameter, $\frac{1}{2}$ inch.

Filling the flats or flower pots with soil

The prepared soil is put into the flat or pot and well pressed into the corners and around the sides. As the center is filled, the soil is uniformly firmed with the finger tips. The flat or flower pot is filled to the top and leveled to the edges without hard packing. Next, the soil is so firmed with a piece of board that the surface is approximately $\frac{1}{2}$ inch below the edges of the flat.

Soil sterilization¹

Many seedlings are subject to damping-off, a disease caused by fungous organisms common in garden soil. The small seedlings are attacked near the surface of the soil and the stem rots. The plant then topples over. It is, therefore, best to sterilize the soil before it is used. Undoubtedly, the most efficient and convenient way to get sterilized soil is to purchase it from a local florist or nurseryman who has sterilizing equipment. Home sterilization is, however, possible by the following treatments.

Formaldehyde treatment²

The formaldehyde treatment has been a standard and effective method of sterilizing soil for many years and has several advantages: anyone can use it; it is inexpensive as the formaldehyde costs less than a cent a flat; it disinfects soil, seed, and flats in one operation; and it does not impair soil texture as does baking and steaming. There are two precautions, however, to follow: (1) Do not use a heavy soil; and (2) if seedlings are to be transplanted into treated soil, spread the soil in a thin layer to aerate and do not use it until you can detect no odor of formaldehyde when a handful is held to the nose.

If no light porous soil is available, a heavy soil must be lightened by mixing half sand and half soil and adding a considerable amount of peat to prevent severe injury to the new seedlings.

¹Written in collaboration with A. W. Dimock of the Department of Plant Pathology.

²The procedure described is recommended by the Department of Plant Pathology.

Ordinary commercial formalin (40 per cent formaldehyde) is used at the rate of $2\frac{1}{2}$ tablespoons to each bushel of soil or 1 tablespoon to a 20-by-14-by-3-inch flat.

The formaldehyde is diluted with 5 or 6 parts of water. This is sprinkled over the soil and thoroughly mixed in. The treated flats are allowed to stand for 24 hours before seeds are planted in them. After the seeds are sown, the flats should be watered thoroughly.

Muck soil requires 40 per cent more formaldehyde than upland or mineral soil. The amounts are $1\frac{2}{5}$ ounces, or $3\frac{1}{2}$ tablespoons, to each cubic foot of muck. This is $1\frac{7}{8}$ ounces a bushel. One gallon treats 71 bushels, or 90 cubic feet, of muck while 1 gallon is enough for 100 bushels, or 125 cubic feet, of mineral soil.

Oven sterilization

The flats or pots should be prepared in the usual way before the seed is sown. It is well to moisten the flats before placing them in the oven by laying a piece of moist burlap over the surface and watering the soil through the burlap with a sprinkling can or some other device. As soon as the excess moisture has drained away, the flats or pots are placed in the oven, burlap and all, and baked at a moderate temperature (250° to 350° F.) for one-half hour. The chief objection to this method is the unpleasant odor of the baked soil.

Hot-water treatment

Boiling water also may be used. The most convenient method is to prepare the seed flats as described, cover them with burlap, and pour boiling water over the flat. The soil should be thoroughly saturated. A cooking thermometer is placed so that the bulb is near the bottom of the container, and then the hot water is poured onto the flats until the temperature reaches 180° F. The soil should dry for a day or two before the seed is sown. An extra supply of sterilized soil should be prepared to cover the seed.

Commercial disinfectants

Patented products, available from florist and horticultural supply houses, afford some control for the damping-off disease. Such materials should be used according to the recommendations of the manufacturer.

Sand and sphagnum moss

Two other ways to control damping-off that owe their effectiveness to the prevention of contact of seed with soil are practical. The first is to cover the surface of the soil to a depth of $\frac{1}{4}$ inch with fine clean sand that has been washed with boiling water. The seed is sown on top of this layer and covered with more of the washed sand.

The second method is to use sphagnum moss. This may be obtained from florists or in swamps. The moss should be dry or nearly so, and forced through

a $\frac{1}{4}$ -inch mesh screen. The flats are prepared as directed on pages 6 to 8 but the soil level is kept about 1 inch below the edges of the box. A $\frac{1}{2}$ -inch layer of the screened sphagnum moss is put over the surface of the soil. The seed is sown and covered with $\frac{1}{4}$ inch of the sifted moss. The moss is watered lightly several times until it is thoroughly moistened down to the soil and then watered thoroughly to moisten the soil to the bottom of the flat.

Sowing the seed

If boxes are used, it is best to mark the surface of the soil or germinating medium lightly in rows about 2 inches apart (figure 5, E). This enables one to keep the different varieties separate, particularly if he sows one or more full rows to a variety. If pots are used, it is best to sow but one variety to a pot; the seeds may be broadcast.

Care should be taken not to sow the seeds too thick. This is particularly true of fine seeds. They should be at least $\frac{1}{4}$ inch apart.

Covering the seed

The best general rule to follow is to cover the seed in pots or boxes so that it is just out of sight. The soil should be sterilized and finely screened, preferably through a $\frac{1}{4}$ -inch-mesh screen.

A little of the soil is placed in the screen, which should be held 2 or 3 inches above the seed, and worked through the screen with the fingers (figure 5, G). The seed must be uniformly and thoroughly covered. It is best to cover a row at a time, for the seeds vary in size and some varieties require deeper covering than others. If the whole box is covered at one time by shaking the screen over it, the small seeds may be covered too deeply while the larger ones will not be covered enough.

Burlap covering

After the seeds have been covered with soil, it is a good practice to lay a piece of moist clean burlap over the soil (figure 5, H). This prevents the surface of the soil and the seeds from washing when the flat or flower pot is watered. Also it keeps the soil from packing and forming a crust and helps to maintain more uniform moisture conditions. As soon as the seeds start to germinate, the burlap should be removed.

Watering

After the seed is covered, the flat must be watered thoroughly. One method is to place the flat in a shallow pan with water from 2 to 3 inches deep. When the soil is thoroughly moistened, the flat is removed and allowed to drain, then set on top of a small basin of water so that the wick extends into the water, preferably to the bottom of the basin (figure 2).



A. Filling bottom of flat with coarse soil



B. Sifting soil on top of flat



C. Levelling soil with short board



D. Packing soil with short board



E. Making furrows with thin strip of wood



F. Sowing seeds



G. Sifting soil over seeds to cover them



H. Covering flat with burlap

Figure 5. Steps in preparing the seed flat and in sowing seed.

The second method is to water the flat thoroughly through the burlap covering. This can best be done with a sprinkling can; care should be taken to see that enough water is applied to moisten the soil thoroughly to the bottom of the flat or flower pot. It is now ready to set on top of the basin so that the wick extends into the water.

Cultural conditions during germination

For the first few days or until the seedlings begin to appear, sunlight is unnecessary. The temperature through this period, however, should be approximately 68° F. or about room temperature. Just as soon as the seedlings begin to appear, they should be given full light in a sunny window, otherwise they tend to grow tall and spindly. If possible, the temperature should now be reduced to 55° or 60° F. to produce sturdier growth; this is often impractical in the home. Never should the temperature be higher than 70° F.

If the basin under the flat is kept filled with water, the soil will remain at the right moisture content. The basin should be inspected every day or two to make sure it contains plenty of water. The soil must never become dry.

Transplanting seedlings

Seedlings large enough to handle should be transplanted to other boxes, flats, or pots, and spaced approximately 2 inches apart in each direction (figure 6). This is best done when the first true leaves are well developed. With very small seedlings, one may have to wait until they are large enough to handle conveniently.

If a hotbed is available, the seedlings may be transferred to it or, if there is little danger of severe cold weather, they may be transplanted to a cold frame. The construction of hotbeds and cold frames is discussed in Cornell Extension Bulletin 468, *Structures for Starting and Growing Ornamental Plants*. Usually, however, seedlings started early indoors, should be put into a cold frame before the first week of May, because of the danger of freezing. Plants grown indoors should be set outside each warm, sunny day and brought in at night unless the weather is warm. This tends to make a strong, stocky growth.

PERENNIALS

Time to sow seed

MOST perennials that are started in the spring should be sown about the first week in April. Many of them will not bloom the first year. Sowing the seed in special beds or in a cold frame during the middle of May is a convenient way to start perennials.

Perennials that grow easily from seed¹

Achillea	Digitalis	Liatris	Primula
Aethionema	Doronicum	Linaria	(common species)
Ajuga	Echinops	Linum	Rudbeckia
Alyssum	Epilobium	Lobelia	Salvia
Althaea	Erigeron	Lotus	Saponaria
Anchusa	Erinus	Lupinus	Scabiosa
Anthemis	Eryngium	Lychnis	Sedum
Arabis	Eupatorium	Lysimachia	(common species)
Armeria	Euphorbia	Lythrum	Sidalcea
Artemisia	Gaillardia	Malva	Statice
Aquilegia	Geum	Mentha	(common species)
Asphodelus	Gypsophila	Mimulus	Tradescantia
Aster	Helenium	Myosotis	Tunica
Asclepias	Helianthus	Nepeta	Valeriana
Aubrieta	Heliopsis	Oenothera	Verbascum
Bellis	Hesperis	Omphalodes	Veronica
Bocconia	Hibiscus	Onopordum	Viola
Boltonia	Hypericum	Papaver	(common species)
Campanula	Iberis	Penstemon	Sempervivum
Centaurea	Incarvillea	Polemonium	Silene
Cerastium	Inula	Polygonum	Solidago
Chelone	Kniphofia	Potentilla	Stachys
Chrysanthemum	Lamium	Pyrethrum	Teucrium
Coreopsis	Lathyrus	Physostegia	Thymus
Delphinium	Lavandula	Platycodon	Trifolium
Dianthus			Yucca

Perennials difficult to grow from seed²

Acanthus	Clintonia	Gentiana	Nymphaea
Aconitum	Colchicum	Geranium	Ononis
Adenophora	Convallaria	Globularia	Onosma
Adonis	Corydalis	Helianthemum	Phyteuma
Allium	Crocus	Helleborus	Primula
Aenmone	Cypripedium	Hemerocallis	(rarer species)
Arenaria	Dicentra	Hepatica	Pulmonaria
Arnica	Dictamnus	Heuchera	Ramonda
Aruncus	Dodecatheon	Hosta	Ranunculus
Asperula	Draba	Hyacinthus	Saxifraga
Astilbe	Dracocephalum	Iris (species)	Scilla
Brodiaea	Dryas	Leucojum	Senecio
Camassia	Epigaea	Lewisia	Shortia
Campanula (less common species)	Epimedium	Lilium	Thalictrum
Cassia	Eranthis	(most species)	Thermopsis
Ceratostigma	Eremurus	Meconopsis	Trillium
Cimicifuga	Erodium	Mertensia	Trollius
Claytonia	Filipendula	Monarda	Tulipa
Clematis	Fritillaria	Muscari	Wahlenbergia
	Galanthus	Narcissus	

¹Applies to the more common cultivated species and assumes fresh seed.²The beginner should purchase nursery-grown plants or bulbs.

Perennials that do not come true from seed and that should be propagated in some other way

<i>Name</i>	<i>Common method of propagation</i>
Anemone (Japanese varieties)	Division and root cuttings
Aster (Michaelmas daisy)	Division
Astilbe	Division
Chrysanthemum	Division and cuttings
Convallaria	Division
Crocus	Offsets
Gypsophila (only double varieties of paniculata)	Grafting
Helianthemum	Cuttings
Hemerocallis	Division
Hyacinthus	Offsets
Iris	Division
Paeonia	Division and grafting
Phlox	Division and cuttings and root cuttings
Primula	Division and leaf cuttings and root cuttings
Veronica	Division and cuttings
Viola	Division and cuttings
Helenium	Division and cuttings
Narcissus	Offsets
Saxifraga	Division and cuttings
Scilla	Offsets
Sedum	Division and cuttings
Sempervivum	Division and offsets
Solidago	Division
Thymus	Division and cuttings
Tulipa	Offsets

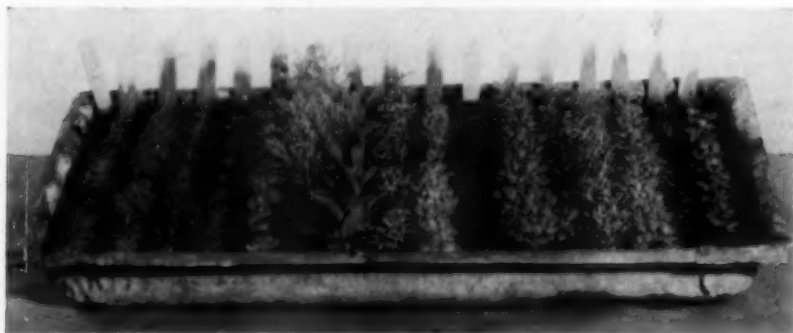


FIGURE 6. SEEDLINGS READY TO TRANSPLANT

**WAYS TO START PERENNIALS THAT ARE
DIFFICULT TO GROW FROM SEED**

PERENNIALS that are difficult to grow from seed require special handling. The method of seeding developed and used at the Cornell Test Gardens has proved satisfactory for several hundred kinds of perennials, particularly "difficult" rock garden and alpine plants.

Purchasing seed

It is important to plant only fresh seed; old ones may not germinate. If orders are placed early in the fall, the preceding summer's seeds are usually received. These can be planted in late October, November, or even December, and put into a cold frame.

Preparing the seed pot

A standard 4-inch clay pot is a convenient and practical size. A smaller one dries out too easily. A larger size is both unnecessary and unwieldy. The pot should be clean, free from soil and algal growth. In the bottom of the pot, is placed 1½ inches of drainage material; broken pots, coarse gravel, or cinders, or any similar material, can be used. This is covered by a ½-inch layer of sphagnum moss or coarse peat moss which keeps the soil from clogging the drainage and helps to maintain moisture. The pot is filled with a specially prepared soil mixture composed of 2 parts of screened loam, 1 part of screened peat moss, and 1 part of clean sand or fine, washed cinders (not ashes). The peat moss keeps the soil from drying out quickly and insures aeration; the sand or cinders help to keep the soil from packing and allows excess water to run through readily. The pot is filled to the top and leveled. Then it must be firmed by pressing it down with the bottom of another pot (or a round block of wood made for the purpose) until the surface is ¾ inch below the rim of the pot. (Figure 7.)

Next, a ¼-inch layer of fine quartz gravel or washed cinders is placed on the surface of the soil mixture. This material should be carefully screened through a ¼-inch mesh onto a sieve containing window screening. The particles which remain on the second screen (about half the size of rice grains, not the dusty material which passes through it) are used. The soil is then moistened and sterilized in the oven as recommended on page 9.

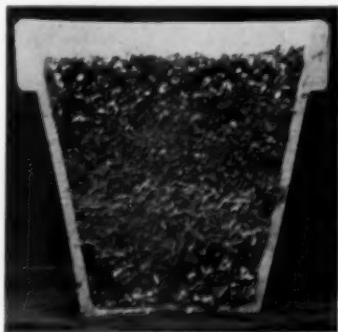


FIGURE 7. A POT PREPARED FOR GERMINATING SEED OF ROCK-GARDEN PLANTS

Sowing the seed

The seeds, many of which are fine and consequently difficult to handle, are sown directly on the layer of gravelly material. They are then covered, not more than ¼ inch deep, with more of the same gravel or cinders. This porous layer under and over the seeds permits a much greater circulation of air than

if soil were used. In this way germination is encouraged and the likelihood of attacks by damping-off fungus is reduced while the seedlings are small and susceptible.

Care of the seed pots

The pots must be thoroughly watered as soon as the seeds are sown and kept moist thereafter *at all times*. The water should be applied with a sprinkling can equipped with a fine sprinkler. The loose surface layer tends to dry out rather quickly, so watering every day or two is necessary. One does not have to water this pot by subirrigation; this is one of its advantages over the conventional kind.

Many of the difficult perennials germinate better if given a cold treatment for 3 months or longer. A temperature of 40° F. is cold enough for most kinds. The pots may be set in the refrigerator or set in moist peat moss, sand, or cinders in a cold frame outdoors. The frame (with the sash on) should be heavily mulched with straw, salt hay, or similar materials when freezing temperatures begin. Alternate freezing and thawing of the soil may crack the pots. The mulch should be removed promptly in the spring when the ground begins to thaw. The sash can be taken off on warm days and replaced on frosty nights.

A small greenhouse is an ideal place to keep the pots over winter and to start plants. It is a simple matter to keep the temperature low by proper ventilation. A cold, moist bulb or root cellar can be used to advantage. Since light is not needed, the pots can be stored in the cellar and watered when needed. In the spring when the seeds begin to germinate, the pots must be moved outdoors to a cold frame.

Handling the seedlings

It is important that the seed pots be kept moist at all times. A single drying out may be fatal. On the other hand, when the pots are outside, they must be protected from heavy rain. Keeping the pots in a cold frame and covering them with a sash in stormy weather is an easy way to accomplish this. The frames should receive as much sunlight as possible in the spring, but they must be shaded during the hot, summer months.

The seedlings should be transplanted when the first set of true leaves develops. Fast-growing kinds can be set directly into prepared soil in a cold frame. This soil should be screened and contain about one-third peat moss. These plants usually are large enough to put into the garden by early fall. The more delicate, slow-growing kinds do best if put in 2½-inch pots, in a similar soil mixture and plunged in moist sand or peat moss in a cold frame. It is often necessary to carry these plants over the winter in the frame, which must be mulched. They are ready for the garden the following May or early June.